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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/451,256	11/29/1999	STEVEN R. HOLLASCH	MSI-448US	8802

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EXAMINER	
AMINI, JAVID A	
ART UNIT	**PAPER NUMBER**
2672	13

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/451,256	HOLLASCH, STEVEN R.
	Examiner	Art Unit
	Javid A Amini	2672

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *23 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Arguments

Applicant's arguments filed April 23, 2004 have been fully considered but they are not persuasive.

- Regarding claims 23 and 34 rejected under 35 U.S.C. 112, first paragraph: Applicant on pages 17-19 argues that the Office (Examiner) does not understand the claim language of claim 23 "wherein none of said polygons share a vertex." Applicant refers Examiner to read the specification on page 10, lines 1-9. Examiner's reply: On page 10 lines 1-9 of specification refers to fig. 3, which illustrates 4 polygons (triangles) 302, 304, 306 and 308 and seven vertices v1-v7. The vertex v3 shared by two polygons 302 and 304, vertex v5 shared by three polygons 308, 306 and 304, vertex v6 shared by two polygons 308 and 306 and finally the vertex v4 is shared by polygons 306 and 304. Consequently, the specification is support of the polygons share vertex.
- Applicant on page 26 lines 3-23 argues that the reference Yamrom does not determine shapes that have no chance of intersecting the ray. Examiner's reply: the claim language on page 2 lines 11-13 claims "<u>determining, on the basis of the positions</u> of the shapes relative to the reference object, those shapes that have no chance of intersecting the ray, and those remaining shapes that may intersect the ray". The reference Yamrom in col. 4, lines 3-10 determines the intersection with a value of zero when there is no chance of intersecting the ray.

- Applicant on pages 27-35 lines 24-25 and 1 respectively argues that the reference does not disclose the step of "defining a reference object relative to the collection of polygons and that contains the cast ray." Examiner's reply: Yamrom in col. 1, lines 42-52 teaches the claim language as a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object (defined reference). A ray is projected through a point-of-interest on the closed-surface polygonal mesh. An intersection point between the ray and a surface of the object is determined and the location of the point-of-interest is adjusted in response to the location of the intersection point. The projecting is performed for a plurality of points in the closed-surface polygonal mesh in order to approximate the object.
- Applicant on pages 36-41 argues that the reference does not disclose the claim's subject matter, specifically the terms " defining a sub-set of polygons from a collection of polygons that approximate an object". Examiner's reply: The step of Applicant's claim subject matter is inherent because, Yamrom in col. 2, lines 21-48 teaches a reduced mesh to the surface of an object to approximate the object. If the object is a complex model, the reduced mesh has fewer polygons (e.g. triangles) than the complex model but still accurately represents the surface to be modeled and maintains a predetermined degree of smoothness.
- Examiner's note: Mesh Modeling: The modeler specifies a set of vertices, edges, and polygons. The reference specifies a set of vertices, edges, and polygons from a collection of polygons by projecting a ray through a point-of-interest on an

object. For complex shapes this can be very time consuming especially for objects that are very organic in shape (i.e. not a lot of straight lines) because every curve requires many points to specify. However, the recent introduction of sub divisional surfaces has made mesh modeling more practical for these types of shapes. Applicant should specify and explain more about a surface representations that present invention uses, for example: parametric, implicit and subdivision surfaces.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-22, 24-33 and 35-56 rejected under 35 U.S.C. 102(e) as being anticipated by Yamrom.

1. As per claim 1, "defining a reference object relative to the represented object", Yamrom in abstract discloses a method for modeling an object with a polygonal mesh (examiner's interpretation: pre-determined shapes) includes obtaining a closed-surface polygonal mesh (examiner's interpretation: reference object) and positioning the closed-surface polygonal mesh relative to the object (examiner's interpretation: represented object). As for "determining the positions of the shapes relative to the reference objects using the characteristic data" Yamrom in

abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. As for "determining, on the basis of the positions of the shapes relative to the reference object, those shapes that have no chance of intersecting the ray, and those remaining shapes that may intersect the ray", Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance (Examiner's interpretation: the basis of the positions of the shapes relative to the reference). Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes (Examiner's interpretation: the basis of the positions of the shapes relative to the reference) in the object, the ray 34 may not intersect the surface 36.

1. As per claim 2, "The method of claim 1 further comprising using a predetermined algorithm to determine which one of those remaining shapes intersects the ray", Yamrom in col. 7, lines 6-35 illustrates cylindrical projection algorithm.

2. Claims 3-4, "The method of claim 1, wherein the collection of shapes comprises at least one or plurality of polygonal shape/s", Yamrom in Figs. 2 and 10 illustrates it.

3. Claims 5 and 6, "wherein the collection of shapes comprises at least one or plurality triangle/s", Yamrom in Figs. 2 and 10 illustrates it.

4. Claims 7-9, "The method of claim 1, wherein the collection of shapes comprises a triangle mesh/strip/fan", Yamrom in Figs. 2 and 10 illustrates it.

5. Claims 10, 11, 14 and 15, Yamrom illustrates in Figs. 4 and 5. And also see col. 1, lines 50-52. The step of the reference object comprises a plane is inherent because in order to establish a model (or approximation) of an object, one must define the X, Y and Z planes parameters. That would be the same as the ray X and Y planes. In this case the plane becomes parallel to one of the x, y and z-axes.

6. Claims 12 and 13,"The method of claim 1, wherein said determining the positions of the shapes comprises determining positional aspects of sub-components of individual ones of the shapes to provide the characteristic data", "The method of claim 12, wherein the individual shapes comprise polygons and the sub-components comprise vertices that define the polygons, said determining the positions of the shapes comprising computing the positions of the vertices relative to the reference object";Yamrom in Figs. 3-5 illustrates, how to determine the characteristic data. Yamrom in col. 2, lines 31-47 teaches the positions of the vertices relative to the reference object.

7. As per claim 16, "defining a collection of polygons that approximate an object, individual polygons having a plurality of vertices", "As for casting a ray toward the approximated object"; "defining a reference object relative to the collection of polygons and that contains the cast ray", "pre-characterizing at least some vertices of at least some of the polygons to provide characteristic data that describes the vertices position relative to the reference object; and using the characteristic data to ascertain the positions of the individual polygons relative to the reference object.", Yamrom in abstract discloses a method for modeling an object with a

polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

8. As per claim 17, "wherein the collection of polygons approximate the surface of the object", Yamrom in Fig. 2, illustrates it.

9. Claims 18 and 19, as for "wherein the individual polygons have a similar geometry; and wherein the individual polygons comprise triangles", Yamrom in Fig. 2 illustrates the features of these claims.

10. As per claim 20, "wherein the collection of polygons has a plurality of faces and a plurality of vertices, said faces outnumbering said vertices", Yamrom in Fig. 2 illustrates the features of this claim.

11. Claim 21 and 22, as for "wherein at least two of said polygons share at least one side; at least two of said polygons share is at least one vertex", Yamrom in Fig. 2 illustrates the features of these claims.

12. Claims 24 –27, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

13. Claim 28, Yamrom in Fig. 2 illustrates the features of this claim.

14. Claims 29-30, Yamrom in Figs. 2 and 3 illustrates the features of these claims.

15. Claims 31-33, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based

on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

16. Claim 35, Yamrom in Fig. 2 illustrates the features of this claim.

17. Claim 36, the step of the reference object comprises a plane is inherent because in order to establish a model (or approximation) of an object, one must define the X, Y and Z planes parameters. That would be the same as the ray in the X and Y planes. In this case the plane becomes parallel to one of the x, y and z-axes.

18. As per claim 37, "defining a sub-set of polygons from a collection of polygons that approximate an object by determining which polygons have vertices that satisfy a predefined relationship relative to a reference object; and evaluating the sub-set of polygons to ascertain which of the polygons is intersected by a cast ray", Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In

Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

19. Claims 38 and 39, Yamrom illustrates in Figs. 4 and 5. And also see col. 1, lines 50-52.

20. Claim 40, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

21. Claim 41-42; see Yamrom in col. 8, lines 19-38.

22. Claim 43, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point.

Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

23. Claims 44-46, Yamrom in Figs. 2 and 3 illustrates the features of these claims.

24. Claim 47, the step of the reference object comprises a plane is inherent because in order to establish a model (or approximation) of an object, one must define the X, Y and Z planes parameters. That would be the same as the ray X and Y planes. In this case the plane becomes parallel to one of the x, y and z-axes.

25. Claim 48, Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a

similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

26. Claim 49, Yamrom in Figs. 2 and 3 illustrates the features of these claims.

27. As per claim 50, "A computer graphic processing system comprising: a processor; memory; and software code stored in the memory that causes the processor to implement a ray-intersection algorithm which: casts a ray at a collection of shapes that approximate an object; defines a reference object that contains the ray; pre-characterizes aspects of individual ones of the shapes of the collection to provide characteristic data; and uses the characteristic data to ascertain the position of the shapes of the collection of shapes relative to the reference object.", Yamrom in abstract discloses a method for modeling an object with a polygonal mesh includes obtaining a closed-surface polygonal mesh and positioning the closed-surface polygonal mesh relative to the object. Yamrom in abstract discloses the existence of an intersection point between said ray and a surface of the object is determined and the location (Examiner's interpretation: position using the characteristic data, see Fig. 4 of Yamrom) of the point-of-interest is adjusted in response to the existence and location of the intersection point. Yamrom illustrates clearly in Figs. 3 and 5 that at step 14, it is determined that the ray does not intersect surface, then flow proceeds to step 18 where the projected position is determined based on a reference distance. Both steps 16 and 18 proceed to step 20 where the process ends if all points are processed. If not, step 22 locates the next point for processing. In Fig. 5 shows a similar projection in which the object is placed inside the reduced mesh. Due to holes in the object, the ray 34 may not intersect the surface 36.

28. Claims 51, 52 and 53, Yamrom in Fig. 2 illustrates the features of these claims. Yamrom in col. 7, lines 6-35 illustrates cylindrical projection algorithm.

29. Claim 54, Yamrom in Fig. 2 illustrates the features of this claim.

30. Claim 55, Yamrom illustrates in Figs. 4 and 5. And also see col. 1, lines 50-52.

31. Claim 56, Yamrom in Fig. 2 illustrates the features of this claim.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 23 and 34 rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. "Wherein none of polygons share a vertex" critical or essential to the practice of the invention, but not included in the claims is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). The claim language does not have any logical meaning, because it is not clear whether the invention uses a single polygon or plurality of polygons. How does the approximation of an object detect with only one polygon? However in the specification on page 10 lines 10 sets forth as follows: <u>Other collections can be defined</u> where none of the triangles share a vertex. Therefore the claims languages are not following the specification languages, also see page 2.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Javid A Amini whose telephone number is 703-605-4248. The examiner can normally be reached on 8-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi can be reached on 703-305-4713. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Javid A Amini
Examiner
Art Unit 2672

Jeffery A. Brier
JEFFERY BRIER
PRIMARY EXAMINER

Javid Amini